

Patent
10/714,070

LISTING OF CLAIMS:

Please cancel Claims 4 and 10-13, and amend Claims 1 and 7-9 as indicated.

1. (Currently Amended) A catheter system to change the temperature of blood by heat transfer to or from a circulating working fluid, comprising:
an inlet lumen to introduce a circulating working fluid; and
~~an a single~~ outlet lumen to extract a circulating working fluid, the outlet lumen having a shape that induces mixing in blood flowing past the outlet lumen or in the working fluid,
wherein the outlet lumen and the inlet lumen are configured such that blood flows between the outlet lumen and the inlet lumen.
2. (Original) The catheter system of claim 1, wherein the inlet lumen and the outlet lumen are made of a flexible material.
3. (Original) The catheter system of claim 2, wherein the flexible material is a material capable of undergoing inflation.
4. (Cancelled)
5. (Original) The catheter system of claim 1, wherein the working fluid is saline.
6. (Original) The catheter system of claim 1, further comprising a working fluid supply including a pump, and wherein the pump circulates the working fluid.

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7. (Currently Amended) A catheter system to rewarm a patient, comprising:
a working fluid supply configured to circulate a working fluid, wherein the
working fluid supply is configured to produce a working fluid at a temperature of greater
than about 37°C;

an inlet lumen to introduce the circulating working fluid; and
~~an a single~~ outlet lumen to extract the circulating working fluid, the outlet lumen
having a shape that induces mixing in blood flowing past the outlet lumen or in the
working fluid,

wherein the outlet lumen and the inlet lumen are configured such that
blood flows between the outlet lumen and the inlet lumen.

8. (Currently Amended) A catheter method of inducing a therapeutic state of
hypothermia in a patient comprising:

inserting an inflatable heat transfer element, formed by at least an inlet lumen and
~~an a single~~ outlet lumen, into an artery or vein;

inflating the inflatable heat transfer element by delivering a working fluid to the
inflatable heat transfer element, the temperature of the working fluid lower than that of
the blood; and

passing the working fluid through a mixing inducing path formed by the outlet
lumen, wherein an open path between the inlet lumen and the outlet lumen allows blood
flow therethrough, thereby enhancing heat transfer between the working fluid and the
blood,

wherein the outlet lumen and the inlet lumen are configured such that
blood flows between the outlet lumen and the inlet lumen.

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9. (Currently Amended) A method for warming a body of a patient, comprising:
introducing a catheter having an inflatable heat transfer element, formed by at least an inlet lumen and ~~an~~ a single outlet lumen, the outlet lumen having a mixing inducing shape, into a blood vessel;
circulating a working fluid through the heat transfer element, wherein the working fluid is removed from the heat transfer element by passing through the outlet lumen, the working fluid having a temperature greater than the temperature of the blood vessel; and such that heat is added to the blood to warm the body,
wherein the outlet lumen and the inlet lumen are configured such that blood flows between the outlet lumen and the inlet lumen.

10. (Canceled) The catheter system of claim 1, wherein said outlet lumen comprises a single lumen.

11. (Canceled) The catheter system of claim 7, wherein said outlet lumen comprises a single lumen.

12. (Canceled) The catheter method of claim 8, wherein the outlet lumen comprises a single lumen.

13. (Canceled) The method of claim 9, wherein the outlet lumen comprises a single lumen.